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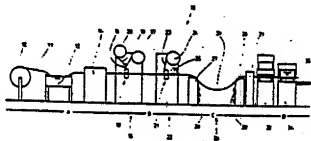
**Title:** **A Process and a Device for Placing Symbols onto a Surface, as well as a Film for Coating a Surface Area and a Plate to be used as a Semi-Finished Product.**

**Cited Publications**

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Abstract:

Up-to-now, automobile license plates have been cut from sheets of aluminum. The identification markings comprised of numerals and letters have been prepared by an embossing and coloring process. The coloring is carried out by transferring a colored layer from a hot-stamping film onto the embossed parts of the plate. For this purpose, the identification- or license plate or the so-called semi-finished base-plate, respectively, will be passed together with the hot-stamping film over or below a heated roll. In the last process step, a separate device has been up-to-now necessary for the input feed of the hot-stamping film. Now, it is provided according to the invention, that the hot-stamping film (23) will be attached to the aluminum sheet or -plate already prior to the embossing of the edge areas of the license plate and prior to the cutting of the individual flat base-plates. Therefore, a special feeding device for the hot-stamping film in the last process step of the embossing and coloring process, will not be needed anymore. Furthermore, the invention deals also with a new film, a semi-finished product, as well as with a device.



## DESCRIPTION

The invention deals with a film according to the generic term of the claim 1, a composite film according to claim 5, a metal plate according to the generic terms of the claims 6 to 8, a usage of a film or a composite film according to claim 10, a process according to the generic term of the claims 11 and 15, as well as with a device according to claim 19.

The background of the invention deals with the preparation of automobile license plates. Strips of a metal sheet of an appropriate size, in particular aluminum sheets, are embossed to form the raised pattern of symbols. Subsequently, the raised parts are to be colored.

The raised pattern includes an edge area surrounding the later license plate, as well as a combination of letters and numerals. The employed metal strips are also often referred to as flat metal tapes.

The coloring of the raised locations may be simply achieved by a rolling contact with a roll carrying the coloring agent. This process has been known for a long time and is still widely used. The needed long periods of time due to the required drying of the dye, as well as the unpleasant odors due to the solvents in the dye and the soiling of the hands and the equipment by the employed dyes, are perceived as a disadvantage.

For avoiding the said disadvantages, it has already been known to carry out the coloring of the raised locations in the flat plate by means of a so-called hot-stamping film. In this case, the metal sheets are cut and embossed in the usual manner. Then, the embossed metal plates are combined under heat and pressure with a film coated with a layer of the coloring material at the side facing the metal plate. The layer of the coloring material will be separated from the film under the effect of heat and will remain attached to the raised locations. As a press-on tool, a heated roll is suitably employed. The combining of the film with the metal plate is carried out immediately prior to the final preparation of the automobile license plate, i.e. after a concrete production order has been received. In this case, it is necessary, that each manufacturer of automobile license plates employing the hot-stamping film system, has to keep in place a respective equipment for unwinding and guiding the film and the strip of the base metal plates.

The objectives to be achieved by the present invention deal with a simplification of the preparation of an automobile license plate and in particular with a reduction of the apparative expenditures for coloring the metal plates.

These objectives have been achieved as described by the characteristic criteria of the patent claims. Advantageous further developments according to the invention may be derived from the sub-claims.

The starting point is the process according to the invention as specified in claim 11 and 15 and the respective sub-claims. Accordingly, it is provided, that the hot-stamping film is at first removably attached to the metal sheet or to a base carrier sheet of a metal or a plastic material, and that only subsequently, the embossing is carried out and the coloring agent is transferred. The placing of the film onto the metal plates or base carrier sheets, may already be carried out during the first process step of preparation or the cutting process, respectively, for cutting the individual metal plates (from a continuous metal sheet). Then, the individual plates laminated with the film may be colored in a simple manner and without requiring expensive film feed- and guide devices, by just applying heat onto the hot-stamping film.

The device according to claim 19 deals with this kind of device for coloring the metal plates by heating the hot-stamping film.

For carrying out the process according to the invention, the film is to exhibit particular properties as specified in the claims 1 to 5. The claim 5 deals with the special case of a composite film. This film consists of a reflecting film and a film according to one of the claims 1 to 4. In some countries, the use of a reflecting automobile license plate is permissible or even mandatory. For this purpose, the entire plate will be laminated with the reflecting film, whereby this film is essentially non-removably attached to the plate, while the hot-stamping film is removably attached to the plate or the reflecting film, respectively.

The claims 6 to 8 deal with a semi-finished product as employed in the process, namely a base carrier plate fitted with a film or a composite film.

Finally, the claim 10 deals with the usage of the film or composite film according to one of the claims 1 to 5.

In the following, advantageous forms of execution of the invention shall be further explained by referring to the attached drawings.

Fig. 1 shows an arrangement of equipment (a production line) for preparing individual plates laminated with films or composite films.

Fig. 2 illustrates a topview onto a plate with an embossed surrounding edge.

Fig. 3 illustrates a sectioned view of the plate shown in fig. 2, along the line III - III.

Fig. 4 illustrates a cross-section through a base metal strip for preparing the plates.

- Fig. 5 illustrates a base metal strip shown in fig. 4 after a reflecting film has been laminated.
- Fig. 6 illustrates the base metal strip shown in fig. 4 after the reflecting film and a hot-stamping film have been laminated.
- Fig. 7 illustrates the base metal strip shown in fig. 4 after the reflecting film and the hot-stamping film have been laminated and the surrounding edge area has been embossed.
- Fig. 8 - 11 illustrate at a magnified scale various variants of the form of execution shown in fig. 7 in the area indicated by the dashed circle.
- Fig. 12 illustrates a sideview of a device according to the invention for embossing and coloring the plates laminated with the film.
- Fig. 13 illustrates the same device shown in fig. 12, as seen in a frontview.

According to the process of the invention, a base carrier sheet (11) is laminated with a film and cut into the prescribed dimensions in a continuously operating production line (10). The base carrier sheet (11) is comprised of a sheet of aluminum, but may also consist of a sheet of another metal or of a plastic material. It is only relevant, that the base material is capable of being embossed.

From a supply roll (12), the base carrier material (11) is supplied and passed through a cleaning bath (13) and is subsequently aligned and smoothed in an alignment station (14). The base carrier sheet material (11) treated in this manner, will be laminated with a reflecting film (16) in an applicator station (15). For this purpose, the reflecting film is stored on a roll (17) above the base sheet material (11) and is combined with the sheet material between a pair of rolls (18) and is firmly attached thereto. The reflecting film is coated with a strong adhesive for providing an essentially non-removable adhesive bond to the base sheet material (11). For this reason, the adhesive side of the reflecting film (16) is covered by a protective paper (19), which is automatically separated and taken up on a roll (20).

The process area of the production line (10) prior to the pair of rolls (18), is designated in fig. 1 by the letter A. The following process area (B) extends up to the pair of rolls (21) in a second applicator station (22). In the process area (A), the base sheet material (11) is passed through the production line (10), whereby the cross-sectional shape is still exclusively flat. In the process area (B), the base sheet material (11) is coated with the reflection film (16) and has thereby become accordingly thicker. In the second applicator station (22), a hot-stamping film (23) is coated onto the

reflecting film (16). This hot-stamping film is continuously dispensed from a roll (24) and is attached onto the reflecting film (16) on the base material (11) by being passed between the pair of rolls (21). The hot-stamping film (23) is coated with a weak adhesive or is provided with adhesive-like properties by a suitable pretreatment or is electrostatically charged, respectively, for achieving a clinging of this film to the reflecting film (16) or the base sheet material (11), respectively. At the same time, the hot-stamping film is provided with a layer of a dye or a coloring agent, which is transferable by means of heat from the hot-stamping film (23) onto the reflecting film (16) or the base sheet material (11), respectively, situated beneath.

According to the invention, it is also possible to use a hot-stamping film without any special properties. In this case, the bonding to the reflecting film (16) or to the base carrier sheet (11), respectively, is achieved by an edge-sided activation of the colored layer by a heated roll contacting only the edge areas. This kind of roll is indicated in fig. 1 by dashed lines and by the reference marking 25.

According to the invention, it is also possible to prepare at first a composite film of the hot-stamping film (23) and the reflecting film (16) and to attach this composite film onto the base-plate (11) in a single process step.

Insofar as permissible according to the official regulations for automobile license plates, the reflecting film (16) may also be omitted. In this case, the applicator station (15) may also be omitted from the production equipment line (10). In analogy to the station (15), the applicator station (22) may also be provided with a roll for taking up a protective cover-paper attached to the hot-stamping film (23).

Subsequent to the second applicator station (22), a looping- and regulating station (26) is provided. This station is equipped with two loop-supports (24,25), between which the composite structure of the base carrier sheet (11), the reflecting film (16) and the hot-stamping film (23), will form a suspension loop (29). This loop may be controlled by means of light-barriers (30). At a too large suspension loop (29), the production line at the left of the regulating station (26) will be stopped. At a too small suspension loop (29), the production line (10) will be started again or operated with a higher line speed, respectively.

Next to the right loop support (28), a support- and input feed station (31) is provided. In this station, the continuous motion of the production line is changed into an intermittent motion. From here, the composite structure of the carrier sheet (11), the reflecting film (16) and the hot-stamping film (23), is fed in an intermittent motion into a subsequent stamping press (32), where

the composite structure is provided with a surrounding raised edge area of the later automobile license plate. In fig. 2, this surrounding edge area is indicated by the reference number 33.

Subsequent to the stamping press (32), a cutting equipment or punching press (34) is arranged, in which the base-plates laminated with the films and embossed in the edge areas, are cut into their exterior dimensions.

A section of the production line (10) extending from the pair of rolls (21) to the stamping press (32), is marked by the letter C. A last section extending from the stamping press (inclusive) to a receiver table or a storage shelf (35), is marked by the letter D.

In fig. 2, a base-plate (36) is illustrated as seen from above, which essentially represents the final product of the production line (10). In fig. 3, a cross-section of the base-plate is illustrated. In this drawing (fig. 3), the individual laminated films are not shown.

In fig. 4 to 7, the cross-section of the composite structure of the base carrier sheet (11), the reflecting film (16) and the hot-stamping film (23), is illustrated as formed during the processing in the process sections A to D (in fig. 1). In particular, the cross-section of the base carrier sheet (11) as formed in the process section A, is illustrated in fig. 4. The composite structure of the reflecting film (16) and the base carrier sheet (11) as produced in the process section B, is illustrated in fig. 5. Then, the composite structure containing the additionally laminated hot-stamping film (23) according to the process section C, is illustrated in fig. 6. Then, in fig. 7, a particularity is to be illustrated. The number and the arrangement of the composite layers corresponds to the structure shown in fig. 6. Due to the embossing in the stamping press (32), a part-separation of the hot-stamping film (23) from the reflecting film (16) will be possible, namely in the area adjacent to the surrounding edge area (33). In fig. 8 to 11, various variants of this process step are illustrated at an enlarged scale. As shown in fig. 8, the hot-stamping film (23) has been separated from the reflecting film (16) adjacent to the raised embossed edge areas (33). However, as shown in fig. 9, if the hot-stamping film (23) is provided with a strong adhesive and with a sufficient elasticity, the hot-stamping film (23) may also remain attached to the reflecting film after the embossing in the stamping press (32). In fig. 10, the adhesive bonding of the hot-stamping film (23) to the base carrier sheet (11) is illustrated in analogy to fig. 9, but without the intermediate layer of a reflecting film (16). In fig. 11, a case is illustrated in analogy to fig. 8 with a separated hot-stamping film (23) but without a reflecting film (16).

The process variant, where the hot-stamping film (23) is attached onto the reflecting film (16) or the base carrier sheet (11), respectively, by an activation of the coloring layer at a contact with the heated roll (25), corresponds also to the illustrations shown in fig. 8 and 11.

The final product of the production line (10), namely the film-laminated base-plate (36), also referred to as a shield or plate, is at the same time the semi-finished product for a subsequent and final processing step. The equipment needed in this case, is illustrated in fig. 12 and 13. The machine stand (37) has the purpose to house a hydraulic unit (38), which controls the vertical movement of a press-table (40) relative to an upper stamper or plunger (41) by means of a piston-cylinder arrangement (39).

For assuring a fixed positioning of the base-plate (36) on the press-table (40), a not illustrated mounting frame is provided, which take up a total of two base-plates. The embossing of the base-plates is carried out by using positive and negative dies, which are placed against the top- and bottom side of the base-plate (36). By means of the pressure produced between the plunger (41) and the press-table, the desired combination of letters and numerals will be embossed. The base-plates (36) together with the positive and negative dies are placed into the not illustrated mounting frame and are inserted into the area below the plunger (41) in the direction of the arrow (42). For an improved handling, the press-table (40) is provided at the front- and back side with an extension plate (43,44). After the embossing process, the press-table (40) is lowered a certain amount and the embossed plate is conveyed towards the posterior extension plate (44). This extension plate is additionally fitted with a sidewise extension (45). In the place of the removed embossed plate, a new base-plate may be placed onto the press-table (40). At the next upwards movement of the press-table (40), the posterior extension (44) of the table and the base-plate positioned thereon, will be pressed from below against a roller unit (46) mounted at the backside of the machine stand (37). This roller unit is comprised of several transport rolls (47) and a heated roll (48). At a contact with the transport rolls (47), the base-plate is moved into the direction of the arrow (49) and is guided beneath the heated roll (48). At this roll, the layer of the coloring agent at the hot-stamping film, will be activated. The rolls (47,48) are arranged and aligned, respectively, in such a way, that the conveying of the base-plate will take place in the direction of the arrow (49), which is crosswise to the input feed direction (arrow 42). The embossing and the conveying below the rolls (47,48) will occur in two different overlapping processing planes due to the arrangement of the press-table (40) with the respective extension-plates (43,44). Both of these different process steps may be carried out for the various base-plates in the same processing tact.



In another (not illustrated) form of execution, a heated plate may be employed instead of the roller unit (46). In this case, the raised embossed locations of the base-plate (36) will be pressed against the heated plate.

At the completion of these process steps, i.e. after the activation of the coloring layer, only the hot-stamping film remains to be peeled off from the embossed plate. The device illustrated in fig. 12 and 13, will process the base-plates laminated with a hot-stamping film without requiring an extensive mechanism for a film input and -guidance.

#### Legend:

10	Production line	30	Light barriers
11	Base substrate or carrier sheet	31	Support- and input station
12	Roll	32	Stamping press
13	Cleaning bath	33	Edge
14	Smoothing station	34	Cutting device
15	Applicator station	35	Deposition shelf
16	Reflecting film	36	Base-plate
17	Roll	37	Machine stand
18	Pair of rolls	38	Hydraulic unit
19	Cover-paper	39	Piston- /cylinder arrangement
20	Roll	40	Press-table
21	Pair of rolls	41	Plunger or stamper
22	Applicator station	42	Arrow
23	Hot-stamping film	43	Table extension
24	Roll	44	Table extension
25	Heated roll	45	Table appendix
26	Loop control station	46	Roller unit
27	Loop support	47	Transport rolls
28	Loop support	48	Heated roll
29	Suspension loop	49	Arrow

## PATENT CLAIMS

1. A film to be laminated onto a surface area, a shield, an identification plate or the like (a base-plate (36)) or of a continuous base carrier sheet (11) of a plastic material or a metal sheet, whereby the film is coated with a coloring agent for coloring at least part-areas of the base-plate (36) under the effect of an applied energy, wherein an adhesive is applied for producing a removable adhesive bonding between the film (23) and the base-plate (36) or the base carrier sheet (11), respectively.
2. A film according to claim 1, wherein a weakly bonding adhesive layer is employed for producing the bond with the base-plate (36) or the base carrier sheet (11), respectively.
3. A film according to claim 1 or 2, wherein a coating with an adhesive effect or a pretreatment is employed.
4. A film according to one of the claims 1 to 3, wherein an electrostatic charge is employed (for producing a quasi adhesion effect. - HLS).
5. A composite film to be laminated onto a surface area, a shield, an identification plate or the like (a base-plate (36)) or of a continuous base carrier sheet (11) of a plastic material or a metal sheet, whereby the composite film structure is comprised of a reflecting film (16) and a film (23) according to one of the claims 1 to 4, whereby the reflecting film (16) is directly attached to the base-plate (36) or the base carrier sheet (11), respectively, and the film (23) according to one of the claims 1 to 4, is removably bonded to the reflecting film (16).
6. A plate, in particular a plate to be used as a semi-finished product for producing an automobile license plate, wherein the film (23) according to one of the claims 1 to 4, is placed onto the one side of the plate.
7. A plate, in particular a plate to be used as a semi-finished product for producing an automobile license plate, wherein a composite film according to claim 5 is placed onto the one side of the plate.

8. A plate, in particular a plate to be used as a semi-finished product for producing an automobile license plate, wherein the one surface of the plate is covered by a film (23) coated with a layer of a coloring agent for coloring at least part-areas of the surface, whereby the coloring agent will be transferred and adhered under the effect of an added energy, and whereby the film (23) will be removably bonded to the plate due to the sectionwise activation of the coloring layer.
9. A plate according to claim 8, wherein the coloring layer in the areas of the film (23) or at least in parts therefrom situated in the edge zones (33) of the plate, are activated and form in this manner a removable bond between the plate and the film.
10. The usage of a film (23) or a composite film according to one of the claims 1 to 5 for preparing an automobile license plate in conjunction with a base-plate (36) or a continuous base carrier sheet (11) of a plastic material or a metal sheet.
11. A process for placing a lettering onto a surface area, a plate, an identification plate or the like (a base-plate 36), in particular a plate for preparing an automobile license plate, whereby the base-plates (36) are embossed in defined places and the raised embossed areas are colored by means of a coloring layer of a hot-stamping film (23), wherein the hot-stamping film (23) is removably attached to the base-plate (36) and the base-plate (36) with the attached hot-stamping film (23) is embossed and the colored layer is transferred onto the embossed areas by means of heat, whereby subsequently, the hot-stamping film (23) is separated from the plate (36).
12. A process according to claim 11, wherein the base-plate (36), preferably consisting of an aluminum sheet, is laminated with a film (23) or a composite film according to one of the claims 1 to 5.
13. A process according to claim 11 or 12, wherein the hot-stamping film (23) together with a reflecting film (16), are laminated onto a base-plate (36) preferably prepared from an aluminum sheet, whereby the reflecting film (16) is situated between the hot-stamping film (23) and the base-plate (36).

14. A process according to one of the claims 11 to 13, wherein prior to a lamination with the hot-stamping film (23), the base-plate (36) is laminated with the reflecting film (16).
15. A process for placing a lettering onto a surface area, a plate, an identification plate or the like (a base-plate 36), in particular a plate for preparing an automobile license plate, whereby the base-plates (36) are embossed in defined places and the raised embossed areas are colored by means of a coloring layer of a hot-stamping film (23), wherein a substrate or carrier sheet (11) of a metal or a plastic material is continuously laminated with a hot-stamping film (23) and subsequently, individual plates (36) are separated from the composite structure of the base-sheet (11) and the hot-stamping film (23), the laminated plates (36) are embossed and the coloring layer is transferred onto the raised embossed locations by means of heat and whereby finally, the hot-stamping film (23) is separated from the base-plate (36)
16. A process according to claim 15, wherein the base carrier sheet (11) preferably consisting of an aluminum sheet (11) is continuously laminated with a film or a composite film according to one of the claims 1 to 5.
17. A process according to claim 15 or 16, wherein the hot-stamping film (23) together with a reflecting film (16) is laminated onto the base carrier sheet (11) preferably prepared from an aluminum sheet, whereby the reflecting film (16) is situated between the hot-stamping film (23) and the carrier sheet (11).
18. A process according to one of the claims 15 to 17, wherein prior to the laminating with the hot-stamping film (23), the base carrier sheet (11) is laminated with the reflecting film (16).
19. A device for placing a lettering onto a surface area, a shield, an identification plate or the like (a base-plate (36)), in particular a plate for preparing an automobile license plate, whereby the base-plates (36) are embossed in defined places and the raised embossed areas are colored by means of a coloring layer of a hot-stamping film (23), in particular of a film or a composite film according to one of the claims 1 to 5, and whereby the device is comprised of a stamping

press (a piston-cylinder arrangement (39)) mounted in a machine-stand (37) for embossing the base-plates (36) together with the attached hot-stamping film (23) and of a device situated immediately adjacent thereto for heating the hot-stamping film (23) in the raised embossed areas.

20. A device according to claim 19, wherein the device for heating the hot-stamping film has a processing plane, which is situated in the same plane as the processing plane of the stamping press for embossing the base-plates (36).
21. A device according to claim 19 or 20, wherein the device for heating the hot-stamping film (23) is arranged in the backside area of the machine-stand (37) and is connected to the machine-stand (37) or the stamping press, respectively, for permitting a conveying of the embossed plates (36).
22. A device according to one of the claims 19 to 21, wherein conveyor- or transport devices are provided for conveying the base-plates (36) from the stamping press to the device for heating the hot-stamping film (23).
23. A device according to claim 22, wherein a mounting frame for one or several base-plates (36), movable in the processing planes, is provided as a conveying- or transport device.
24. A device according to one of the claims 19 to 23, wherein the device for heating the hot-stamping film (23) is provided with a heating element for activating the coloring layer of the hot-stamping film.
25. A device according to claim 24, wherein the base-plate (36) is conveyed to the heating element by means of transport devices, in particular by transport rolls (47).
26. A device according to claim 24 or 25, wherein the heating element is formed as a heated roll (48).
27. A device according to claim 24 or 25, wherein the heating element is formed as a heated plate, which may be pressed against the base-plate (36) or its raised embossed parts.

28. A device according to one of the claims 20 to 27, wherein the base-plate (36) is fed into the stamping press in its processing plane and in a certain direction (arrow 42) and is, then, conveyed in a direction normal to the first direction (arrow 49) in the processing plane of the device for heating the hot-stamping film (23).
29. A device according to one of the claims 19 to 28, wherein the stamping press is provided with a press-table (40), which is movable in the up- and down direction.
30. A device according to claim 29, wherein the press-table (40) may be pressed against a stamper or plunger (41) and/or an extension (44) of the table connected to the press-table (40) may be pressed against a roll unit (46) or a heated plate.
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4 Pages with drawings are attached

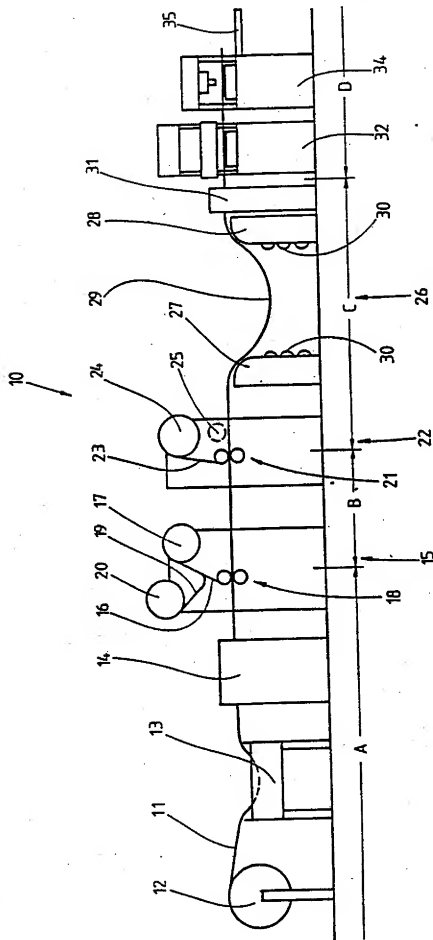


Fig. 1

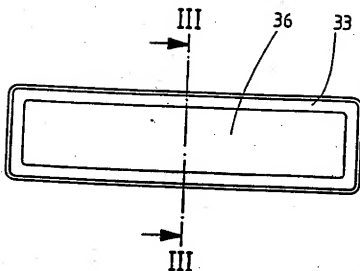


Fig. 2

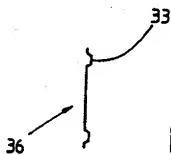


Fig. 3



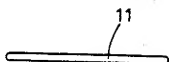


Fig. 4

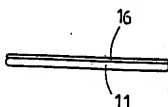


Fig. 5

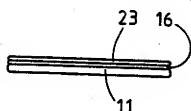


Fig. 6

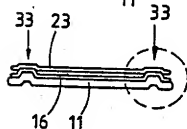


Fig. 7

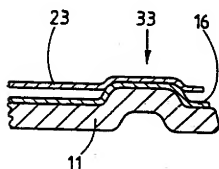


Fig. 8

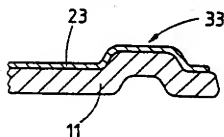


Fig. 10

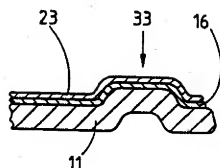


Fig. 9

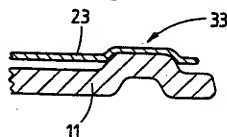


Fig. 11

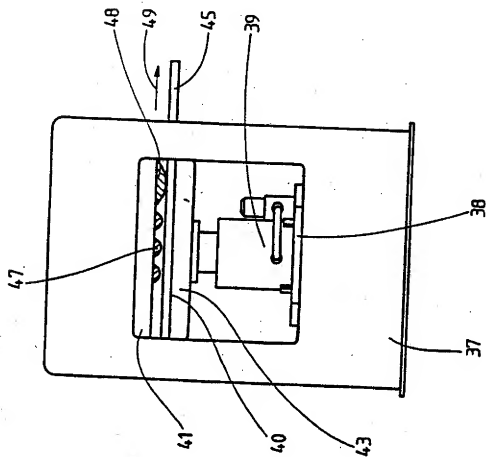


Fig. 13

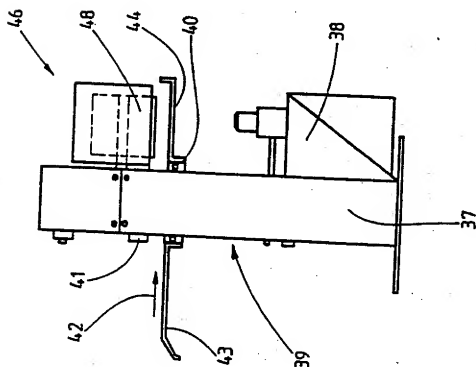


Fig. 12



### Retroreflective and luminous panel for road signalling

Patent number: FR2744519

**Publication date:** 1997-08-08

**Inventor:**

**Applicant:** BERQUE EMMANUEL (FR)

**Classification:**

- International: F21Q3/00; F21V7/00; F21V8/00; F21V13/02;  
G09F13/16; G09F13/18

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**Application number:** FR19960001710 19960207

**Priority number(s):** FR19960001710 19960207

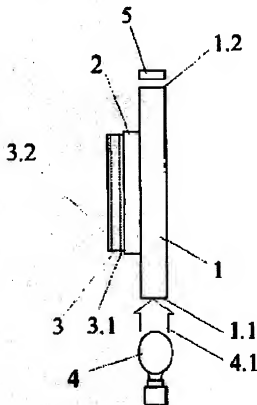
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### Abstract of FR2744519

The panel has a glass or composite plastics panelling (1). The motif with the reflecting surface (3.1) is stuck onto the front of the panel by double sided clear sticky tape. The panel is illuminated from the side with a light bulb (4) to provide an illuminated output. The illuminated output covers an angle of 180 degrees.



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DEMANDE DE BREVET D'INVENTION

A1

22 Date de dépôt : 07.02.96.

30 Priorité :

43 Date de la mise à disposition du public de la  
demande : 08.08.97 Buletin 97/32.

56 Liste des documents cités dans le rapport de  
recherche préliminaire : *Ce dernier n'a pas été  
établi à la date de publication de la demande.*

60 Références à d'autres documents nationaux  
apparentés :

71 Demandeur(s) : BERQUE EMMANUEL — FR.

72 Inventeur(s) :

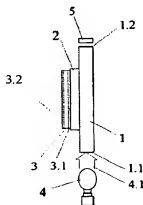
73 Titulaire(s) :

74 Mandataire :

54 DISPOSITIF DE SIGNALISATION LUMINEUSE ET RETROREFLECHISSANTE.

57 L'invention se rapporte à un dispositif de signalisation  
routière possédant une unique surface de signalisation à la  
fois rétro réfléchissante, par la rétro réflexion des rayons in-  
cidents qui y sont projetés; et à la fois lumineuse, par  
l'émergence d'un flux lumineux artificiel généré par une  
source lumineuse artificielle constitutive du dispositif.

Dispositif de signalisation lumineuse et rétro réfléchis-  
sante comprenant au moins une plaque incolore (1) en  
verre ou en composite plastique sur laquelle est collée par  
un adhésif double face incolore (2) la face rétro réfléchis-  
sante (3.1) d'un film rétro réfléchissant (3), une source lumi-  
neuse artificielle (4) caractérisée en ce qu'elle diffuse dans  
l'épaisseur de la plaque incolore (1) un flux lumineux (4.1).



FR 2 744 519 - A1



## Dispositif de signalisation lumineuse et rétro réfléchissante

L'invention se rapporte à un dispositif possédant une unique surface de signalisation à la fois  
rétro réfléchissante, par la réflexion des rayons  
incidents qui y sont projetés; et à la fois lumineuse,  
5 par l'émergence d'un flux lumineux artificiel généré par  
une source lumineuse artificielle constitutive du  
dispositif.

10 Le domaine de la signalisation en général et celui de la  
signalisation routière en particulier utilisent depuis de  
nombreuses années des panneaux de signalisation  
rétro réfléchissants, directionnels ou d'indications. Ces  
panneaux utilisent un film réfléchissant de type  
15 connu permettant, à partir d'un rayon optique incident  
projeté vers le film, de créer un rayon réfléchi dont la  
direction est presque confondue à celle du rayon  
incident.

20 Ainsi, ces panneaux de signalisation routière  
rétro réfléchissants de type connus réfléchissent donc  
dans la même direction la lumière provenant par  
exemple des phares d'automobiles et permettent dans ce  
cas la visualisation de leurs messages même de nuit. Il  
existe aujourd'hui divers type de films  
25 réfléchissants se différenciant par leur technologie  
et leur puissance de réflexion.

Néanmoins, ces diverses technologies sont toutes  
basées sur un principe unique de réflexion qui, par  
définition n'est pas une source de lumière artificielle  
30 autonome. En effet, la visualisation des panneaux  
rétro réfléchissants nécessite d'une part une projection  
de lumière incidente provenant d'une source lumineuse  
extérieure au panneau et d'autre part d'être placé dans  
35 l'alignement optique des rayons de cette même source.

Si ces deux conditions ne sont pas réunies, le panneau rétro réfléchissant ne produit pas son effet et le message de signalisation routière n'est pas facilement visible. De plus, de part les technologies utilisées, le coefficient de rétro réflexion est directement lié à l'angle existant entre les rayons incidents et le plan du film, et ceci dans toutes les directions. De fait, plus cet angle est proche de 90° et plus le pouvoir réfléchissant est important, à l'inverse plus cet angle est tangent à la surface du film et plus le pouvoir réfléchissant diminue.

En outre, la constante augmentation du trafic routier implique aujourd'hui la mise en oeuvre de panneaux rapidement lisibles, quelque soit l'implantation, et plurifonctionnels de manière à limiter la surabondance visuelle engendrée par la juxtaposition de panneaux à fonction unique: les panneaux lumineux sont par exemple adjoints aux panneaux rétro réfléchissants pour en renforcer l'impact visuel.

La présente invention a pour but de remédier à ces inconvénients en proposant un dispositif bifonctionnel possédant une surface de signalisation unique étant à la fois rétro réfléchissante, permettant ainsi le remplacement à l'identique tout type de panneau rétro réfléchissant classique, et à la fois lumineuse par la production d'un flux lumineux artificiel émergent de cette même surface et couvrant un angle de vision de 180° dans toutes les directions.

A cette fin, le dispositif comprend au moins une plaque incolore sur laquelle est collée la face rétro réfléchissante d'un film rétro réfléchissant par un adhésif double face incolore et qu'en outre le dispositif comprend une source lumineuse artificielle produisant un flux lumineux dans l'épaisseur de la dite plaque.

Le dispositif est également caractérisé en ce que la matière de la plaque incolore peut être du verre ou un composite plastique, de même que l'adhésif double face incolore peut être une colle incolore.

5

La rétro réflexion de la surface ainsi que la production d'un flux lumineux artificiel sortant de cette même surface sont décrites de manière plus détaillée à l'aide de quelques dessins annexés.

10

La figure 1 représente une vue d'ensemble de face et suivant la coupe AA du dispositif selon l'invention.

15

La figure 2 représente une vue suivant la coupe AA du dispositif selon l'invention dans le cas d'une unique rétro réflexion d'un rayon incident.

20

La figure 3 représente une vue suivant la coupe AA du dispositif suivant l'invention dans le cas d'une production de flux lumineux artificiel émergent.

25

Comme illustré sur la figure 1, le dispositif selon l'invention se compose d'une plaque incolore (1) en verre ou en composite plastique servant de support à l'adhésif double face (2). Le film rétro réfléchissant (3) est appliqué sur sa face rétro réfléchissante (3.1), sur l'adhésif double face (2). Le film rétro réfléchissant (3), de type connu, peut posséder une face adhésive (3.2) au verso de la face rétro réfléchissante (3.1), cette face adhésive (3.2) n'est pas utilisée dans l'assemblage du dispositif. La source lumineuse artificielle (4) produit un flux lumineux (4.1) concentré dans l'épaisseur de la plaque (1). Pour améliorer la pénétration et la saturation lumineuse, la plaque (1) possède une tranche dépolie (1.1) du côté de la source (4) et un miroir de champs (5) renvoyant une partie des rayons (4.1) vers la source (4).

35

40



Comme illustré sur la figure 2, le dispositif selon l'invention reçoit un rayon incident (6.1) émis par une source lumineuse extérieure au dispositif. Le rayon (6.1) traverse la plaque incolore (1), l'adhésif double face incolore (2) pour frapper la face rétro réfléchissante (3.1) du film rétro réfléchissant (3). La propriété réfléchissante du film renvoie donc le rayon incident (6.1) dans une direction presque confondue formant ainsi le rayon réfléchi (6.2). De fait, tout rayon incident provenant d'une source lumineuse extérieure est systématiquement renvoyé vers cette même source et permet au film rétro réfléchissant (3), de type connu, de conserver ses caractéristiques sans altération. Le rayon incident (6.1) se déplace dans l'air et change de milieu lors de la pénétration dans la plaque (1) et au travers de l'adhésif (2). La déviation de direction engendrée par la différence des indices optiques des milieux traversés est en pratique insignifiante car l'épaisseur de la plaque incolore (1) et de l'adhésif double face (2) n'est que de l'ordre de quelques millimètres. De ce fait, la direction du rayon réfléchi (6.2) est sensiblement identique à la direction du rayon incident (6.1) comme peut l'être la rétro réflexion d'un rayon incident en rayon réfléchi sur un film rétro réfléchissant nu de même type.

Comme illustré sur la figure 3, la source lumineuse artificielle (4) projette un flux lumineux (4.1) dans l'épaisseur de la plaque incolore (1) par la tranche dépolie du côté (1.1). Le rayon lumineux (7) est un des multiples rayons composant le flux (4.1). Ce rayon (7) circule donc dans la matière de la plaque (1) par réflexion sur chacune des deux faces (1.3) et (1.4) jusqu'au miroir (5), contre la tranche du côté opposé (1.2), qui le réfléchit vers la source lumineuse artificielle (4). Les réflexions du rayon (7), contre la face (1.3) et la face (1.4), sont totales tant que de la plaque incolore (1) n'est pas en contact physique avec l'adhésif double face (2).

En réflexion totale, le rayon (7) conserve une grande partie de son énergie photonique. Au niveau du collage de la face rétro réfléchissante (3.1) sur la face (1.3), le rayon (7) se sépare en une partie réfléchi vers la face (1.4) et une partie émergente formant le rayon (8). Cette émergence est engendrée par la résultante de la pénétration mécanique due au collage par l'adhésif double face incolore (2) de la face rétro réfléchissante (3.1) sur la face (1.3) induisant localement un contact d'indice optique différent de celui de l'air sur le reste des faces la plaque (1). Ce rayon émergent (8) se diffuse à travers l'adhésif double face incolore (2) pour devenir un rayon incident de la face rétro réfléchissante (3.1). De ce fait, le rayon (8) engendre le rayon réfléchi (9) qui émerge de la plaque (1). Il en va de même pour la production des rayons (7.1, 8.1, 9.1).

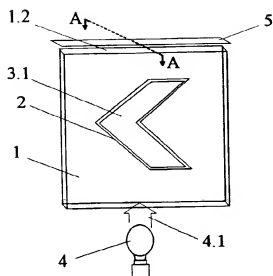
L'intensité du flux (4.1) engendre un grand nombre de rayons lumineux possédant des directions différentes et induisant par conséquent des angles de réflexions différents sur les faces (1.3) et (1.4).

Par conséquent, la totalité des rayons réfléchis engendrent, grâce au collage du film rétro réfléchissant (3), la diffusion sur 180° d'un flux lumineux émergent de la plaque (1) proportionnel au flux entrant (4.1). L'utilisation du miroir (5) de la tranche du côté (1.2) permet d'augmenter la saturation lumineuse dans l'épaisseur de la plaque (1) et donc d'augmenter le flux lumineux émergent.

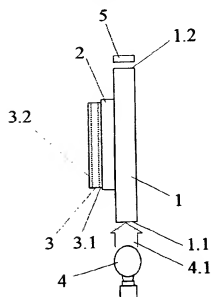
La source lumineuse artificielle (4) peut être une lampe à incandescence ou un tube fluorescent ou des diodes électroluminescentes.

## REVENDECATIONS

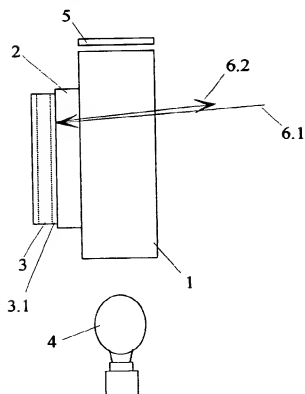
1. Dispositif de signalisation lumineuse et rétro réfléchissante comprenant au moins une plaque incolore (1) en verre ou en composite plastique sur laquelle est collée par un adhésif double face incolore (2) la face rétro réfléchissante (3.1) d'un film rétro réfléchissant (3), une source lumineuse artificielle (4) caractérisée en ce qu'elle diffuse dans l'épaisseur de la plaque incolore (1) un flux lumineux (4.1).
2. Dispositif suivant la revendication 1, caractérisé en ce que le flux lumineux (4.1) est diffusé dans l'épaisseur de la plaque incolore (1) par la tranche dépolie d'un côté (1.1) et qu'en outre un miroir (5) est disposé contre la tranche du côté (1.2) opposé au côté (1.1) de manière à réfléchir une partie du flux lumineux (4.1) vers la source lumineuse artificielle (4).
3. Dispositif suivant la revendication 2, caractérisé en ce que la source de lumineuse artificielle (4) soit une lampe à incandescence ou un tube fluorescent ou des diodes électroluminescentes.

**FIG.1**

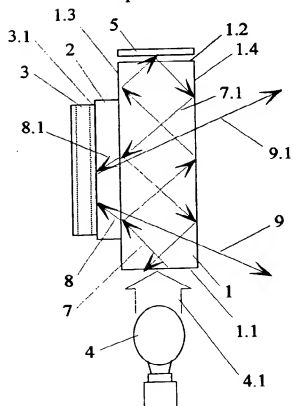
Coupe selon A.A

**FIG.2**

Coupe selon A.A

**FIG.3**

Coupe selon A.A



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